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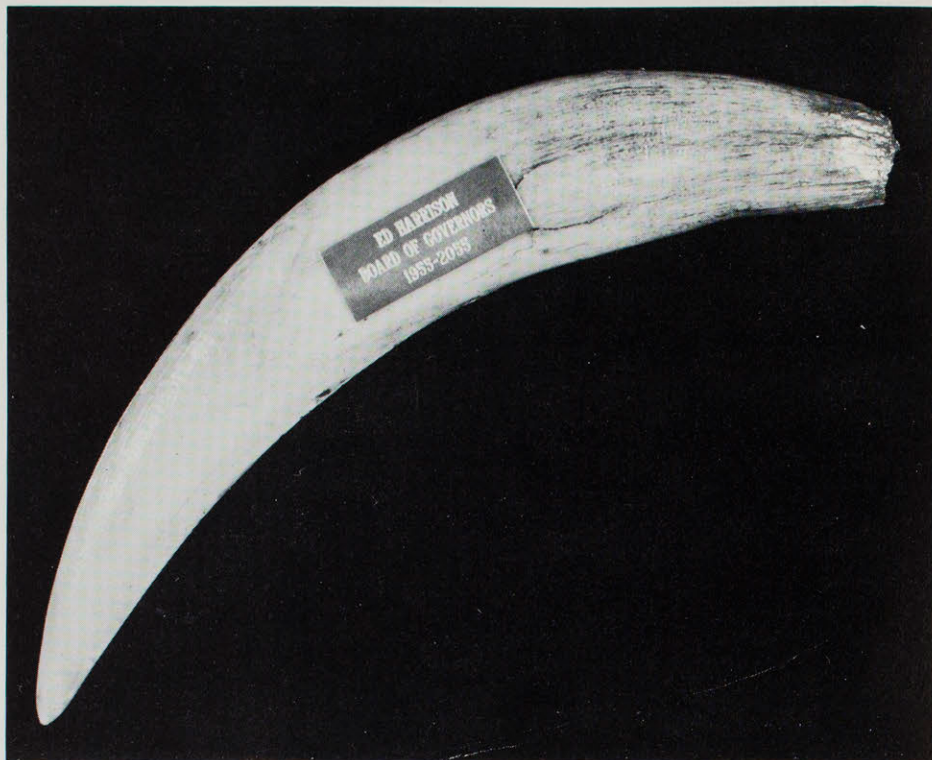
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MUSEUM ALLIANCE
900 Exposition Boulevard
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A Message from the Editor

The Quarterly, which has been published in 4-color process on a regular basis for some time, (exception: The Soule Indian issue which called for sepia), will now have 4-color process in 2 issues a year only. The reason: retrenchment. We are losing members and, thereby, income. The solution and a quick return to routine 4-color process throughout the Quarterly is more new members. If each of you who read this were to obtain one new member, the Quarterly's troubles, and the Alliances', would be over.

40,000 year old Cat Tooth



The year past will perhaps be best remembered at the Museum as the year of the dig. In one of the most ambitious and unusual projects undertaken by the Museum Foundation, the famed Rancho La Brea tar pits were re-opened for the first major exploration in more than half a century.

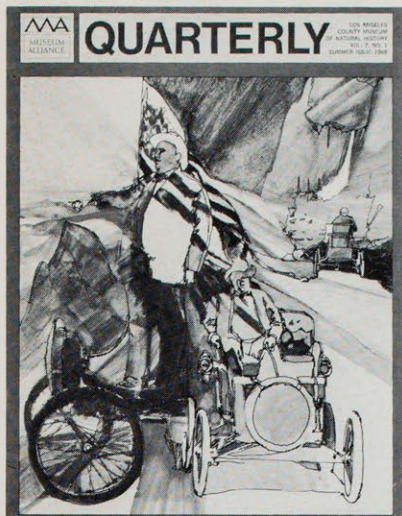
To mark this event, the Museum Alliance has commissioned the casting of a precise reproduction of the sabre of the sabre tooth cat. The sabre is modeled after the Museum's specimens of this fierce cat which roamed

here more than 40,000 years ago. The specimens were themselves taken from Rancho La Brea during its initial investigation in 1906 — 1915.

Equally effective as a paper weight or a conversation piece, the sabres are being presented to all Contributing, Sustaining and Life members. Each sabre will carry a small brass plate with the member's name engraved on it.

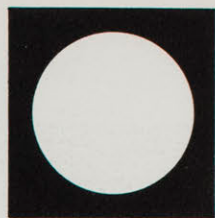
This reproduction will be given to all new Contributing, Sustaining and Life members.

Quarterly Cover Illustrations Win Plaudits



The Two Museum Alliance Quarterly cover illustrations shown above were on exhibit during December and January in the Illustration West Show sponsored by the Los Angeles Society of Illustrators. All pieces selected for this show are chosen by a select jury as outstanding examples of the illustrators' craft.

This Show, held annually at the Los Angeles Museum of Science and Industry in Exposition Park, attracts thousands of viewers and is considered a trendsetter in the graphic art community. Both illustrations are by George Bartell. The one on top "First Auto in Yosemite" appeared on the summer 1968 issue. The one below "The Man who Photographed Indians" appeared last spring 1969.



Museum Spotlight

New Preparator in Life Sciences



Steven L. Hill

A new preparator has recently been added to the Life Sciences staff of the Los Angeles County Museum of Natural History. Mr. Steven L. Hill, a specialist in the preparation of biological specimens for exhibit, has begun work in the Habitats section of the museum. Born in Columbus, Ohio, Mr. Hill received his higher education from Ohio State University where he majored in biological sciences. Mr. Hill resides at 116 North Avenue 56 in Los Angeles.

MUSEUM DONORS

The following people have made contributions of \$50 or more to the Los Angeles County Museum of Natural History and have been given honorary memberships in the Museum Alliance in appreciation of their contributions:

Mr. and Mrs. Crawford N. Cate
Mr. and Mrs. Felix Guggenheim
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Mr. Arthur W. Nordstrom



QUARTERLY

LOS ANGELES COUNTY MUSEUM
OF NATURAL HISTORY
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The Los Angeles County Museum of Natural History QUARTERLY is published for the MUSEUM ALLIANCE. Dorothy H. Seligman / Editor; Harry Pack, Frank Page / Art Editors; Armando Solis / Museum Photographer; Mary Butler / Museum Illustrator. QUARTERLY Committee / Russell Belous, Sage Belt, Jane Dart, Theodore Downs, Herbert Friedmann, Peter Furst, Glenn Hiatt, Katharine Hotchkis, Gretchen Sibley, Richard Lipscomb, Fred S. Truxal, Robert Wade, Robert Weinstein.

LOS ANGELES BLACK HERITAGE

by William M. Mason
and
James Anderson

While the period of rapid growth in Los Angeles' history as a major American city with a large Afro-American population belongs to the last thirty years, we are concerned here with the period which precedes this era. The least-known and least-understood aspect of California's history of its black citizens is that of the Hispano-Mexican period, with only scant attention to the period between 1887 and 1900. This is partly due, of course, to the fact that these eras are prior to the memory of men now living. However, even the history of black Los Angeles since 1900 has not yet been carefully researched, although abundant materials are still available.

This essay concentrates on the early formative era. James Anderson has recently begun his research on the important period from 1910 - 1940. Some of his findings appear at the end of this article. A future publication will incorporate this work with additional materials relating to the last quarter century.

Los Angeles was founded by eleven families, some 44 persons in all, of whom 26 were of African ancestry. There were two Caucasians, the rest

Indian or Indian-Caucasian. Since there were few "sons of Castile," some writers on the subject have felt free to slanderously accuse our founding families of various crimes, and avarice. These writers have also managed to explain away our founders, alleging that they went back to Mexico, or just disappeared. None of this is true, of course. Of the eleven families who came to California to begin Los Angeles, only one family returned to Mexico. Of the ten families who stayed, only one failed to leave heirs. From the nine founding families, there are today several thousands of their descendants. It is interesting to note, however, that few descendants of these original *pobladores* (settlers) will openly claim descent from them.

It is time, we think, to set the record straight. The founders of Los Angeles were neither better nor worse than the rest of the soldiers and settlers who came to California during the Spanish rule. Their conduct was average and they performed their assigned tasks. Los Angeles did precisely what it was supposed to do: feed the presidios of San Diego and Santa Barbara, send sons as recruits for the presidio gar-

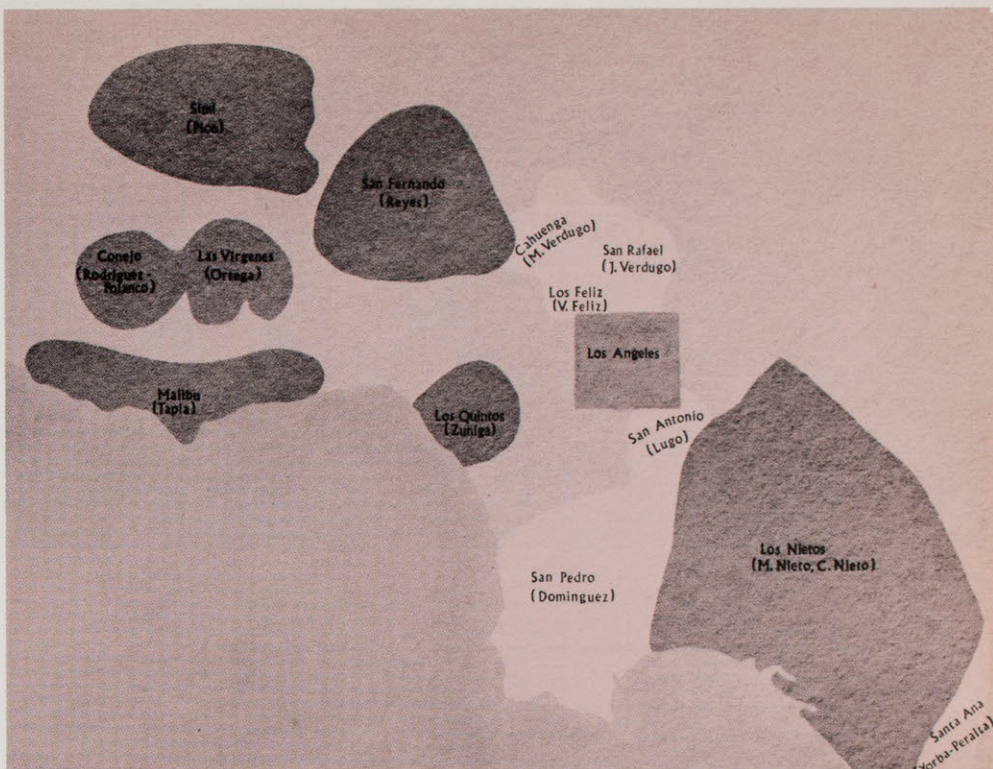
risons, and provide a place for old soldiers to retire and become farmers.

Another important point should be considered. The presidios were garrisoned by soldiers, of whom some were of African ancestry, like the *pobladores*. During Spain's rule, California was settled primarily by expeditions from Mexico between 1769 and 1781. Thus, most of the families who settled during the Spanish era were already in California when the census of 1790 was made; and this is a most interesting document. According to the census, 18 percent of the California colonists were of African descent; that is, they were indicated as *mulatos*, *pardos*, *morizcos*, or *color quebrado*, all terms for part-African castes in Mexico. When other lists and documents are consulted, the percentage is somewhat higher. African blood is traceable in about 30 percent of California's colonists according to census material and marriage records in Mexico.

The census of 1790 also reveals certain early California marriage patterns. *Espanoles*, *mulatos*, and *indios* were frequently married to one another. Men who were from Spain are

Map showing Ranchos in the Los Angeles Area, 1784-1810. Simi, Malibu, San Fernando, Los Quintos and Los Nietos ranchos were held by *mulatos*; Conejo and Las Virgenes by *indios* and *mestizos*; Cahuenga, San Rafael, Los Feliz, San Antonio, San Pedro, and Santa Ana were held by *espanoles*. These ranchos were held by the following people: Simi - Santiago Pico, granted by 1795. Los Coyotes - Ignacio Rodriguez and Jose Polanco, granted in 1803. Las Virgenes - Miguel Ortega, granted by 1805. Malibu - Bartolo Tapia, granted in 1804. San Fernando - Francisco Reyes, granted about 1788, relinquished to the

Franciscans in 1797 for San Fernando Mission. Cahuenga - Mariano Verdugo, granted about 1790. San Rafael - Jose Maria Verdugo, granted in 1784. Los Feliz - Vincente Feliz, granted about 1800. Los Quintos - Pio Quintos Zuniga, granted about 1795, relinquished by his heirs after his death in 1806. San Antonio - Antonio Maria Lugo, 1810. San Pedro - Jose Maria Dominguez, 1784. Los Nietos - Manuel Nieto and Crispin Nieto, 1784. Santa Ana - granted to Pablo Grijalva by 1800, later to his sons-in-law, Antonio Yorba and Juan Peralta, 1806.



to be found married to *mulatas* and *indias*. There was no deterrent to miscegenation in early California, legally or socially. That the castes were indicated at all on muster rolls and censuses in California was probably a formality demanded by the government in Mexico City.

Land grants were available to the *mulatos* of California. In the vicinity of Los Angeles, the Pico brothers held Simi; Francisco Reyes was granted the San Fernando Valley, which he later gave up to the Franciscans for their mission there; Bartolo Tapia held the coastline from Topanga Canyon to Ventura County; Pio Quinto Zuniga had the Ballona grant near Venice and Ocean Park; and Manuel Nieto was given a large section of southern California — the land between the San Gabriel River and the Santa Ana River from the seacoast to the present Santa Ana Freeway. During the 1820's, Maria Rita Valdez was granted Rancho Rodeo de las Aguas. She was the granddaughter of Luis Quintero, *negro*, and Petra Rubio, *mulata*, one of the founding families of Los Angeles. Rita Valdez' rancho is today known as Beverly Hills.

From 1793 to 1795, Francisco Reyes, owner of the San Fernando Valley, was also *alcalde*, or mayor, of Los Angeles. As compensation for San Fernando, Reyes received another rancho near Lompoc, and may have received some money as well. He was one of Los Angeles' more successful citizens in its early years, until his death in 1809.

Pio Pico, grandson of Jacinta de la Bastida, a *mulata* on the 1790 census in Los Angeles, is chiefly remembered as the last governor of California during the Mexican period. He once owned a large rancho in San Diego County, now the Camp Pendleton Marine Base. A small town in southern California and a boulevard in Los Angeles are named for him. His brother, Andres Pico, rose to the rank of general in the army of Mexico, and led Mexican forces to inflict a stinging reverse on the Americans at San Pascual during the Mexican War.

While it is difficult here to explain fully the differences between Latin-American and Anglo-American attitudes on race, slavery, and assimilation, it should be pointed out that slaves in Mexico were at all times

considered human beings; in the United States they were simply property. In Mexico slaves were permitted to marry and no master could sell and separate wives and husbands or children, and it was relatively easy for a slave to obtain his freedom, whether by saving for purchase or through manumission, which was socially encouraged. Lastly, and perhaps most importantly, there was a place in society for the freed slave in Mexico. He was not an outcast, as were freedmen even in the northern United States, but was able to assimilate himself into the society with relative ease. The lot of the free black in Mexico contrasts strongly with the freed slave in the United States, where in many parts of the southern states he was not allowed to live. He could be enslaved again if he remained too long in certain communities, and he had few of the privileges of white people. Slaves in Mexico could petition the government for their freedom if mistreated, and their pleas were often granted — almost unheard of in the United States. The attitude toward slaves in Mexico is illustrated by the Bishop of Puebla, who, when he heard



Pio Pico, Circa 1852. He was born at San Gabriel Mission in 1801, later became governor of California, 1845-1846, until the American invasion. His grandmother was a *mulato* on the census of 1790. His wife is shown with him here.



C. C. Flint's Grocery Store, 1904. This store, at 239 East Second Street, had a variety of goods. Note the old gaslight fixture. Flint came to California in 1883, opening his grocery in 1901. Lent by Mrs. Lena Brown.

that certain Spaniards were forcing their slave women to be their concubines, forced them to marry their slaves or be threatened with excommunication. A slave woman could be freed if raped by her master. It is from this kind of socio-economic background the early black settlers of California came.

In the province of Sinaloa, where the settlers for Los Angeles were recruited, one-third of the inhabitants were considered to be of African origin. In the city of Rosario, where most of them were living when they enlisted, about two-thirds of the inhabitants were *mulatos*. Although slaves from Africa were still being brought to Rosario while the Los Angeles *pobladores* were living there, nearly 90 percent of the *mulatos* there were free. Most of those of African descent, who came to Los Angeles, had probably been free for generations.

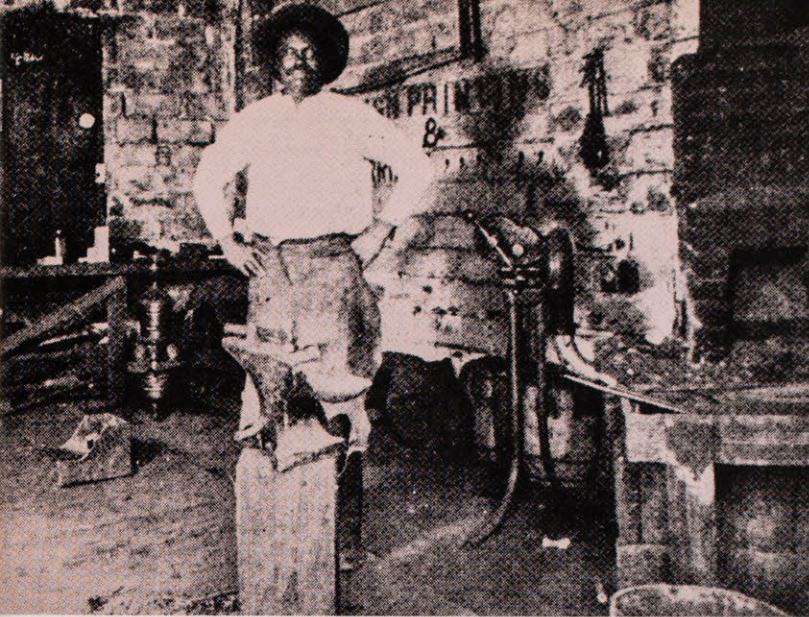
Between the time that Spain relinquished control of Mexico and the conquest of California by the United States, there were a few American blacks, sailors for the most part, who

settled in California. The first known Afro-American to live in Los Angeles was Thomas Fisher, who was a sailor aboard Bouchard's ship when the latter attacked California in 1818. Fisher and an Anglo-American named Joseph Chapman were captured by the Spanish forces and later lived in Los Angeles for some time. Although much has been written about Joe Chapman, we know little about Tom Fisher. He played a significant role in the conquest of Los Angeles by American troops in 1846, during the Mexican War, serving as a guide on the route from San Pedro to Los Angeles. Another black American named Joseph Vincent Lawrence settled in Los Angeles around 1822, marrying a young widow named Rita Canedo. An otter hunter, Alan Light, was in the area, primarily in Santa Barbara. James Beckworth, the noted mountain man, is said to have visited the Los Angeles area on more than one occasion.

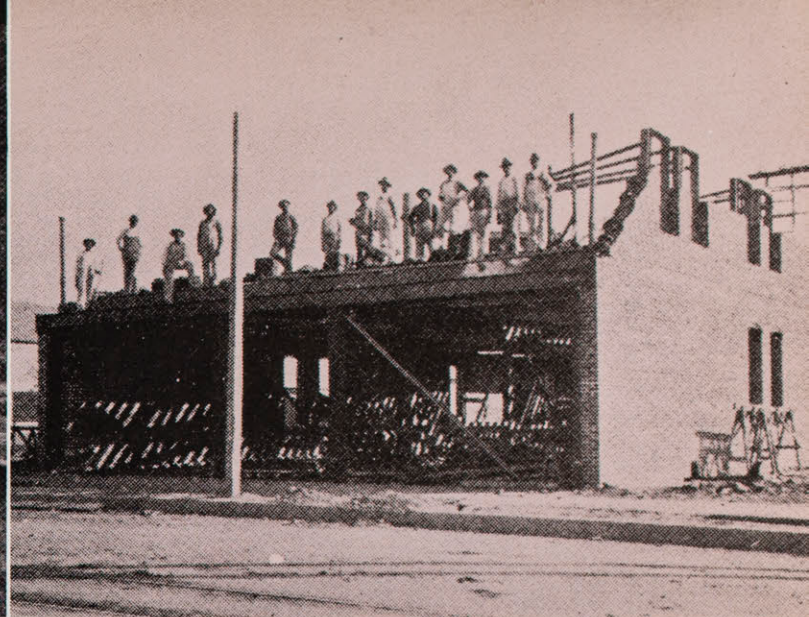
When American troops occupied Los Angeles in 1847, there were a few Afro-Americans who accompanied them. One was Peter Biggs, the slave

of one of the officers, who was freed upon arrival in Los Angeles. Biggs became the first American barber in Los Angeles, and became a link between the Anglo-American and the Mexican community. He married a Mexican woman in 1852, and was one of Los Angeles' more interesting citizens during the 1850's and 1860's. The total American black community of Los Angeles during the 1850's, however, amounted to not more than some 60 persons. From this decade came the early pioneer black families, such as the Smarts, Owens, Masons, Ballards, Greens, Peppers, and others. Members of these families had much influence among the black community of Los Angeles until the great influx of people in the 1940's.

Los Angeles between 1850 and 1870 was a rough little cowtown, where violence was common. Lynchings were frequent, but none of the victims was black. Anglo-Americans lynched Mexican-Americans, and Mexican-Americans lynched Anglos. This western carnival was climaxed with the lynching of 19 Chinese one night in 1871. It must have been owing more



John Donnell's
Blacksmith Shop, 1904.
Donnell was one of four
Negro blacksmiths in
Los Angeles and he had
his shop at 238 South
San Pedro Street near
Azusa Street. His anvil
is in front of him, and the
forge is to his right.
Lent by Mrs. Lena Brown.



A Black Construction
Crew, 1904. They were
hired by Nat Dryden, a
white contractor who
employed blacks in
skilled labor, contrary
to the prevailing policy
of that day.

to the prudence of the local blacks rather than the forbearance of the whites which kept the noose away from their necks. There was even a patronizingly friendly article now and then in the *Los Angeles Star*, a newspaper noted for its southern sympathies.

One of the most outstanding women who came to Los Angeles during the 1850's was Bidley Mason. A Georgia-born slave who was brought by her master to California in 1851, she was freed by the court order of Judge Benjamin Hayes in 1856, when Bidley's former owner tried to take her and her three children to Texas to sell them. Once free, she set to work as a midwife and nurse for Dr. John Griffin, a pioneer physician of Los Angeles. When she had accumulated enough money in 1865, she bought four large lots in the block between Spring and Broadway, Fourth and Third Streets, then part of the southern end of Los Angeles, but later downtown area. Bidley Mason built a small house on the property and lived there for some years. Later her grandsons, Robert and Henry Owens, built a livery stable

on this property. During the Boom of the 1880's, she refused \$250,000 for her property, saving it for her heirs. Three years after her death, in 1891, her grandsons built a substantial business building on the property, between Third and Fourth Streets on Broadway, called the Owens Brothers Block.

From 1850 to 1880, the black population of Los Angeles grew slowly; in 1880, there were 102 out of a population of 11,000. Less than one percent of the city was Afro-American. During this period, and after a hard-won legal battle led by Louis Green, black men received the right to cast their ballots in the city's 1870 election. Until then their right to register under the Fifteenth Amendment had been challenged. Twenty-five black men were eligible, and nearly all registered to vote.

In the years immediately following 1880, a few more blacks came from the southern United States, but there was relatively little increase before 1886. A railroad rate war, plus Southern California propaganda, lured thousands to Los Angeles between

1886 and 1888, causing the great Boom of the 1880's in southern California. From a small town of 11,000, Los Angeles rose quickly to a population of 50,000. Among the 39,000 newcomers there were at least 1,100 blacks. The census of 1890 shows 1,258 in the city. Thus 1890 is the date of the beginning of a substantial black community in Los Angeles. There were a few areas of black concentration in the city, developing around Second and San Pedro Streets, Second and Alameda Streets, while some were moving into the new tract around Eighth Street and Maple Avenue. As in 1880, however, when the black population was scattered about the city, there were still many households here and there within the city, some in what was then the downtown area around First and Main Streets.

Many of those who came to Los Angeles had intended to work in service occupations, such as waiters, coachmen, washerwomen, and other domestic services. But an important part of the immigration to Los Angeles came to work in certain skilled trades.



Catarina Moreno, about 1860. The granddaughter of the *mulatos pobladores*, Jose Moreno and Guadalupe Perez, she married the brother of Pio Pico, General Andres Pico.



Biddy Mason. Arriving in Southern California as a slave in 1851, she was granted her freedom by court order in 1856.

Carpenters, brickmasons, plasterers, teamsters, and others came, as well. The newcomers found the city crowded. Although blacks found rooming houses throughout the city, some places would accept only whites, particularly those which catered to tourists. Rooming houses for laborers in Los Angeles were thus better in this respect, since they were less expensive. As a result, blacks tended to settle in that part of Los Angeles which catered to the busy construction gangs employed in the city. Hundreds of artisans and laborers lived in the rooming houses on First and Second Streets east of Los Angeles Street, and it was in this area that the early black population concentrated. Weller Street was the first street to have a number of black-owned businesses, while Azusa Street was probably the first street in Los Angeles to be inhabited only by blacks, and was the site of the first church building constructed expressly for them. This was the Azusa Street African Methodist Episcopal Church. On Weller Street, during the 1890's,

there were the following businesses: Coleman Baker's barber shop; Julius B. Loving's livery stable, coal and feed yard; Benjamin F. Talbot's carriage and wagon works, as well as his hotel, Talbot House; the Alpha Club; Ed Meyers' saloon; the Little Liberia Restaurant; and others. Half a block away, on Second and San Pedro Streets, was the Kansas City House, a hotel owned by Andrew J. Jones, later to be known as "Biscuit" Jones, restaurant-owner. Weller Street, only a block from Azusa Street, was the social gathering-place, especially for men who frequented the barber shop, restaurant, saloon, or club.

Other settlements in Los Angeles were along Alameda Street between First and Third Streets, on Rose and Hewitt Streets just east of Alameda, and the newly-built houses around Eighth Street and Maple Avenue. Some blacks lived around Banning and Turner Streets just east of Alameda, on Central Avenue north of First Street, and on Jackson Street. Perhaps the first black-owned hotel in

Los Angeles was on North Central Avenue (then called Vine Street) named Alvine House and later Ohio House, owned by Joseph Henry Green. He had come to Los Angeles in the early 1880's and was for a time headwaiter at the Pico House Hotel's dining room.

By 1900, Los Angeles had a population of 102,000, of whom 2,100 were listed on the census as Negro. Although only 2 percent of the population, the blacks had a surprisingly good share of the businesses, considering that only about 100 of these people had been in the city twenty years before. There were a few black businesses on East First Street in the early 1900's. In those days, East First Street had Japanese, Russian-Jewish and Negro businesses side by side, from Los Angeles Street to Central Avenue in what was then a busy workingman's thoroughfare. Black muscle was again a sought-after asset for the new building boom between 1902-1908, and during this period their financial and business acumen was not lacking.

During the early 1900's, an inter-urban railway was being built in Los Angeles County. Most of the railroad workers were Mexicans and, in 1903, they attempted to strike for higher wages. The company against whom they struck replied by hiring several hundred Japanese employees and brought in 1,400 black employees from other states, particularly Texas, where the Southern Pacific Railway had many employees. This was not the only source of Afro-American migration to Los Angeles. The boll weevil destroyed some of the cotton economy in the south-central United States, starting in Texas. This plague forced people north and west from the south. At the same time, perhaps as a result of widespread economic frustration and failure, racial tensions in the south had reaped a fearful harvest of anti-Negro outbursts. Los Angeles received a small portion of this population movement. The percentage of increase in its black population, from 2,100 to 7,600, was slightly more than the percentage of the white population's increase. The period from 1900 to 1910 was, for the most part, a prosperous one, except for a

recession in 1908, obliging some of the new immigrants to search elsewhere for a home.

Of this population of 7,600, a few were policemen, firemen, and other civil service employees, but professional positions for members of the black community had not come easily; that blacks were able to advance into better occupations was due more to the dedication of men and women who sought these positions, rather than to the goodwill of the community as a whole. By 1910, there had evolved a small but influential professional elite, the doctors, lawyers, editors, and ministers who were able to offer a certain amount of leadership in the black community. Robert Owens was one of several who had made his fortune in Los Angeles and was able to influence both the black and the white community. Several families had done rather well in real estate, the mania of Los Angeles.

The employment structure of Los Angeles did not differ greatly from the rest of the United States, however, as far as blacks were concerned. Service and heavy laboring occupations were quite available to them, but white-collar jobs were most difficult to obtain. Hundreds of men were employed as track laborers on the railroad. Others were janitors, waiters, deliverymen, or domestics, while women found work as laundry employees, maids, and similar occupations. A very few highly-qualified women were able to find teaching and other professional positions.

By 1920, the Negro category in the census of Los Angeles had risen to 15,000, roughly double the 1910 figure. During the preceding decade, Central Avenue had become the black community's main street, eclipsing all other black business centers. East Second Street, Santa Fe Avenue, and other centers still functioned, but they could no longer compete with Central Avenue. The crossroads for the community were at Twelfth Street and Central Avenue. It should not be assumed that this thoroughfare was uncontested by whites. In 1914, Mrs. Mary Johnson purchased a house on East Eighteenth Street just off Central Avenue. Most of the inhabitants of the

street were white, and many took exception to the presence of Mrs. Johnson and her family there. One day, while she was not at home, her neighbors broke into her home and removed everything she had, throwing her belongings on her front lawn. This act of hostility was reported in the local newspaper, and resulted in some 100 black women forming a brigade to protect the Johnson home during the emergency.

In 1918, Frederick Madison Roberts was elected to the state assembly. He won handily over a rival who went about passing cards saying, "My opponent is a nigger." Mr. Roberts remained in the assembly for sixteen years, working diligently for his district and for the Republican Party. When he was forced to relinquish his seat in 1934, it was to a young Democrat named Augustus Hawkins.

Shortly after the end of World War I, there was a revival of activity on the part of the Ku Klux Klan which hoped to capitalize on the disillusionment in the nation caused, in part, by the war and the failure of America to promote a lasting peace. The fear of the alleged "Bolshevik Conspiracy" helped to facilitate a national reaction in 1919, and the Klan rode on its coattails. Los Angeles was also infected by this feeling, and the Ku Klux Klan established itself firmly in southern California during the 1920's.

It was in this period that some of the previous gains in improving community relations were lost. The Los Angeles Fire Department, previously integrated, was now segregated. In 1927, racial restrictions in housing covenants came into being in Los Angeles. Prior to that time, some de facto housing segregation existed, but the 1927 agreements, which were designed primarily to exclude Orientals, Mexicans, and Jews, were used now against the Negro. Thirty years before, only the price of a house would determine where one lived. Blacks lived scattered about the city, in East Los Angeles, West Temple Street, the south side, and downtown. In the 1920's, there were actually efforts to evict them from places where they had been living for some time, such as the Western and Arlington

areas.

Public swimming pools were restricted throughout southern California. Negroes and Mexicans were allowed to swim only on Thursdays — the day before the water was changed. Even public beaches were threatened with discrimination. In Santa Monica, black people had enjoyed bathing and picnicking on the sand since the 1870's. One of their favorite restaurants in Santa Monica was the Neptune Gardens. In 1928, however, Arthur Valentine was forcibly removed from the beach by the Santa Monica police. Mr. Valentine was obliged to use the courts in order to insure his, and others of his race, the right to enjoy the sands of Santa Monica.

The heightening of racial barriers in the 1920's was further complicated by the Depression of the 1930's, when jobs were nearly impossible to find for black and white alike. Whites received preference in hiring, while most blacks found only the most menial jobs. The W.P.A. later afforded some employment for black workers, but it is interesting to note that while Caucasian white-collar workers were given jobs in their specialty, Negro white-collar workers were given laboring jobs. Once, when the latter were assigned to a trash heap removal task, their strenuous objections found them positions more in keeping with their skills.

The Depression was a time of trial for most of Los Angeles, and particularly for the jobless black. Within a few years, although few could predict a sudden change, Los Angeles was to become one of America's major urban centers of black population. A measure of prosperity was to be had during World War II, and thousands would move here. Slowly, the black population had been increasing proportionately in the city. In 1920, only 2.6 percent was black; in 1930, 3.1 percent; and by 1940, 4.3 percent was black. Between 1942 and 1945, nearly 100,000 blacks settled in Los Angeles, and by 1950, the percentage had risen to 8.7 percent. It is in this period of the last thirty years that Los Angeles became a major metropolitan center of black America.

Ant Warfare Offensive and Defensive Maneuvers

Roy Snelling

Curatorial Assistant
Entomology

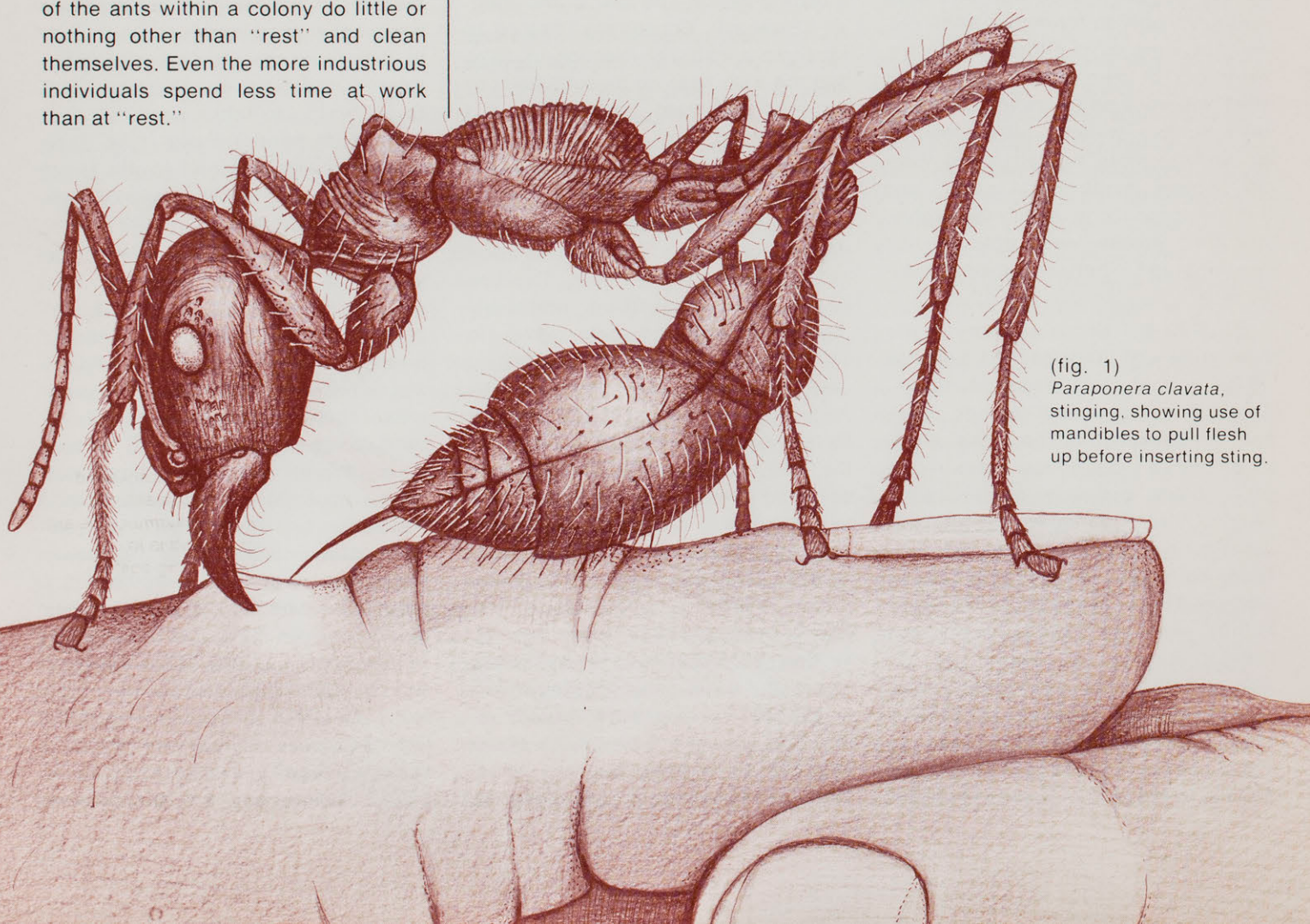
Some authors and seekers after Utopias have been inclined to suggest that ants have developed a most admirable form of social organization. Consequently, we have been admonished, at least as far back as the time of Solomon, to consider the ways of the ant, for therein is wisdom. Hopefully, Solomon's idea was that we should consider the virtue of the unceasing toils of ants and their providential storage of foods. That Solomon was not a particularly astute observer is apparent, for the majority of the ants within a colony do little or nothing other than "rest" and clean themselves. Even the more industrious individuals spend less time at work than at "rest."

A common observation among writers and casual observers is that the life of an ant is one of peace and harmony. In other words, ants do not war among themselves. Such is true, as far as it goes, but the observation does not go far enough. Ants are, quite literally, their own worst enemies. Before going further into the subject of ant "warfare" there remains a point which must first be clarified.

An ant colony should not be considered a conglomeration of individuals banded together for the "common good." Rather the colony should be viewed in quite a different manner: the colony—in *toto*—is the individual and the numerous ants which comprise this "individual" function, not as individuals, but in a manner analagous to cells within the body. The female, or queen, is the

reproductive unit within this body and the workers, as cells, provide food, remove waste and protect against invaders. On this basis, each "individual" or "colony" is concerned with its own welfare and is constantly and consistently in all-out competition with other "individuals" or "colonies" of the same or other species. There are exceptions to this xenophobia, but they are rare, indeed, and we lack much data on these.

Very nearly all species of ants have well-developed means of defense or offense. The simplest of these is that which is shown by our common brownish lawn ant, or Argentine ant. Whenever possible they overcome a foe simply by sheer numbers. The numbers of ants within a colony of this species often run into the hundreds of thousands. This is difficult to appreciate because for much of the year the colony exists as a number of fragmentary colonies which may be



(fig. 1)
Paraponera clavata,
stinging, showing use of
mandibles to pull flesh
up before inserting sting.

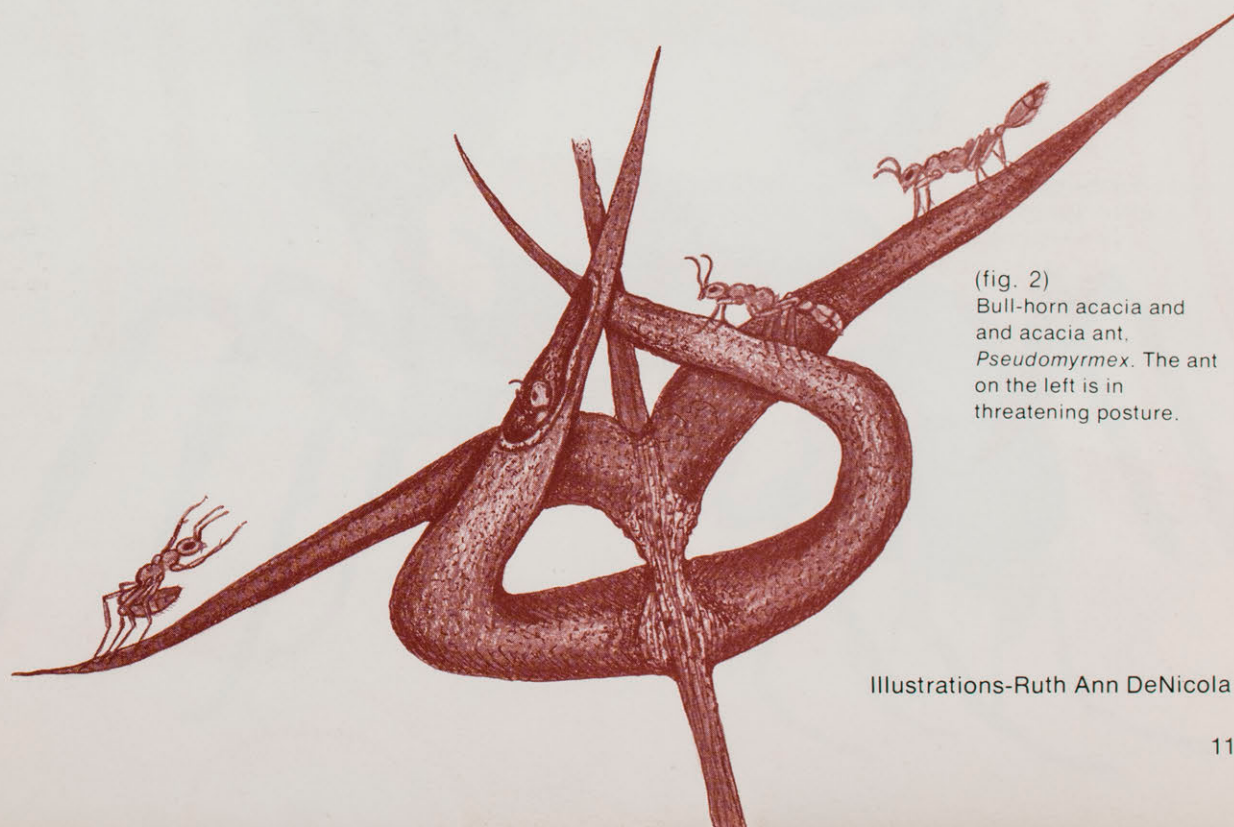
scattered over an area of several city blocks. Sometimes, especially in areas with colder winters than ours, these fragments recombine and spend the winter as a single large mass in semi-hibernation. Since colonies of the Argentine ant contain up to several hundred reproductive females, the fragments are perfectly capable of functioning as separate entities, and often they do in our area.

The workers of the Argentine ant are small, with small mandibles, and they lack a sting. But the species is an aggressive one and the ants swarm out in large numbers, many attacking each intruder. If possible, they will grasp its appendages, often several to each, and "spread-eagle" their opponent. Once so immobilized, the enemy will be dismembered by other Argentine ants. Such a method may, of course, be used either defensively or offensively. It is not restricted to Argentine ants, but is a fairly common method employed by harvester ants, big-headed ants, fire ants, acrobat ants and many others. Most of these other types of ants employ additional modes as well.

The defense-offense mechanism most commonly used by ants, and one well-known to most people, is the sting. As a rule, when people refer to "ant bites" they actually mean stings. Many ants bite, but the action is a wholly mechanical one which does nothing more than pinch the skin. In the case of some large ants this can be mildly disconcerting but is seldom painful. The sting of an ant, however, is quite a different matter and can be extremely painful. The sting is located at the tip of the abdomen and is used much as a hypodermic to inject toxic substances. The mechanics of the act of stinging are simple, but are also a source of confusion. When aroused, the ant grasps the skin with the mandibles to gain leverage. Then, the sting is applied and the poison injected. Most stinging ants bend the tip of the abdomen forward beneath the body and insert the sting at or near the point grasped by the mandibles (fig. 1). Since most people are far too concerned with removing the ant to be very observant about the process by which they are discomfited, they are unaware that they are "stung" rather than "bitten." The effect of ant stings on people varies from species to species and individually among people. Some are consistently rather painful. The common large red harvester ants of the southwestern United States have the most painful

stings of any in our area. The immediate result of a sting by one of these ants is an intense, but short-lived, pain at the site of the sting. Usually, within a few minutes a large white welt, up to 10 mm. in diameter, is raised. By this time the pain has decreased to the point of being a dull, throbbing ache which may persist for several hours.

The sting of a fire ant, while usually less intense, is often more persistent and may last for up to several days. Some species of fire ants cause an ulceration at the site which may last a week or more and be subject to secondary infection. In general, the more primitive ants have the most effective stings, some of which can, for a human, be excruciating. The ponerine ants are primitive hunting ants which sting their prey. Some of these are large ants (exceeding one inch), but the large species are all tropical. One tropical American species, *Paraponera clavata* (fig. 1), has an exceptionally painful sting and is greatly respected by natives of areas where it is found. Several stings are said to be enough to incapacitate a man for a day or more.



(fig. 2)
Bull-horn acacia and
acacia ant,
Pseudomyrmex. The ant
on the left is in
threatening posture.

Illustrations-Ruth Ann DeNicola

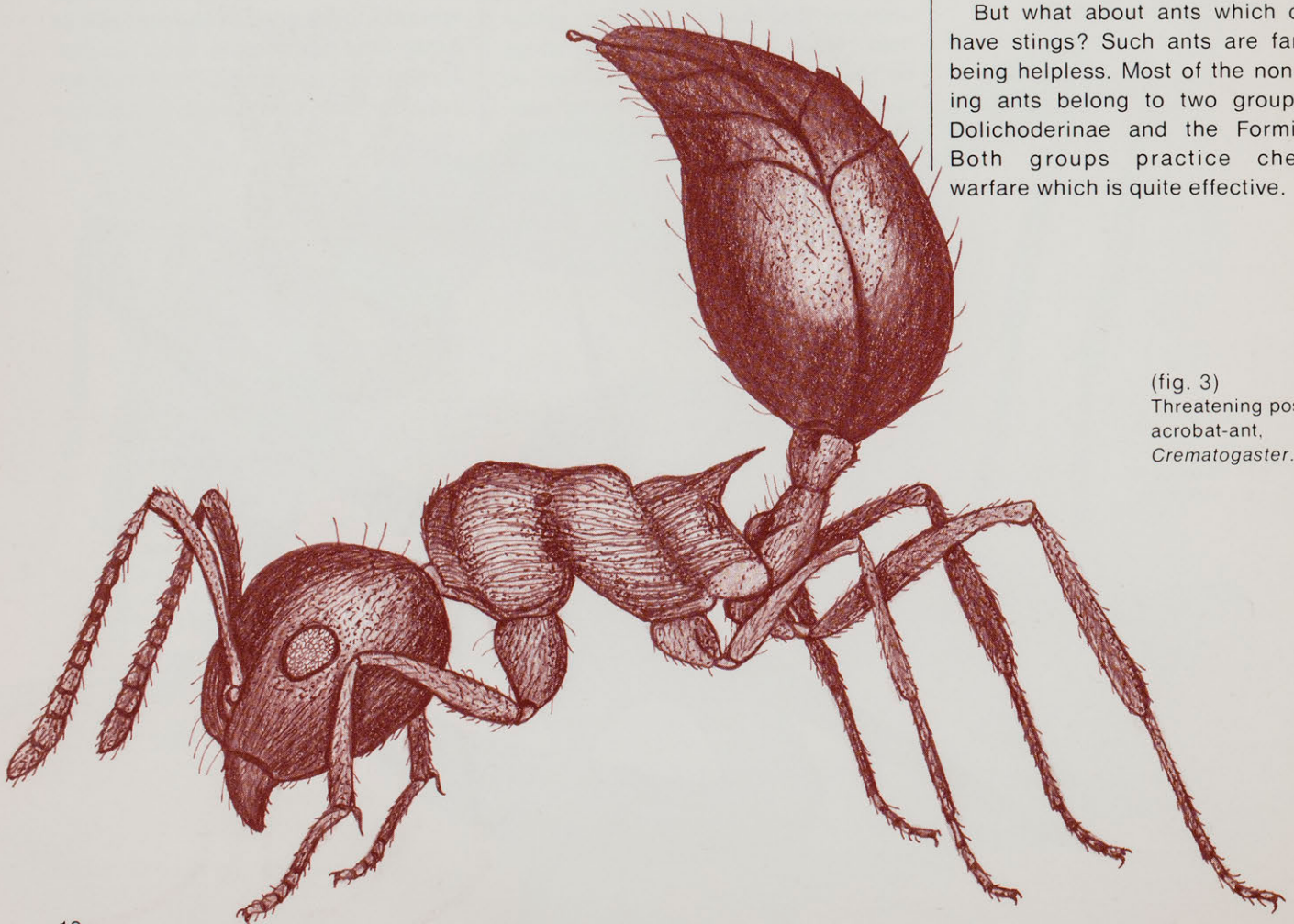
Another ant greatly respected for its stinging capabilities is the Australian bull-ant or bull-dog ant. When disturbed, these fierce ants pour out of their nests and attack any intruder with great persistence. In the American tropics is found still another kind of ant which is renowned for its ability—and readiness—to inflict pain. This ant is a slender, delicate-looking species which lives in the hollow thorns of the bull-horn acacia (fig. 2). When the plant in which they reside is touched, the ants swarm out of the thorns and run about the leaves seeking the source of the disturbance. If the cause is, for example, a browsing cow, the ants immediately attack and drive the animal away. In this manner, the plant, which is both home and food-source for the ants, is protected from grazing mammals. The ants also serve to keep down the numbers of plant-eating insects which would, under other circumstances, feed on the acacia.

The acrobat ants of the genus *Crematogaster* have a modified sting. The tip of the sting is flat and broadened (spatulate) and is incapable of penetrating flesh. When excited an acrobat ant will raise the abdomen and bring it forward over the body (fig. 3). When the ant grasps the enemy with the mandibles, the spatulate sting is used to apply poison, either at the site of the bite or merely on the body. This poison does not appear to be lethal but is apparently both repulsive and irritating. Insects, and other small arthropods, when so attacked, are obviously distressed and compelled to retreat.

The venoms used are complex materials and vary from one group of ants to the next. The venoms of such typical myrmecine ants as the harvester and fire ants are non-proteinaceous, water soluble ketones. The more primitive ponerine and pseudomyrmecine ants possess water soluble ketones with protein materials. Some, such as that of the fire ants are not only effective when injected into the bodies of insects, but may be fatal when painted on the outside of the body; there is a residual effect about equal to that of DDT and some antibiotic effect.

While stings are undeniably a potent means of dealing with an enemy, the use of mandibles has not been ignored in evolutionary development. Some ants, by virtue of their large size, are capable of giving a very respectable nip with their mandibles and may, on occasion, actually tear out a bit of flesh from a larger animal. If the animal attacked is another insect it may be either crushed or severely mangled. Mandibles are rarely the sole means of defense/offense.

But what about ants which do not have stings? Such ants are far from being helpless. Most of the non-stinging ants belong to two groups, the Dolichoderinae and the Formicinae. Both groups practice chemical warfare which is quite effective.



(fig. 3)
Threatening posture of
acrobat-ant,
Crematogaster.

In the Dolichoderinae the poisonous or repellent material is highly aromatic and is produced by glands at the apex of the abdomen. A common constituent of this material is butyric acid which is strongly repellent to most insects; it has a very characteristic rancid odor which may, depending on the ant species, range from that of rancid butter to that of rotten coconut. To humans it is disagreeable in small quantities and nauseating in large doses. When the colony is disturbed, these ants rush forth and, with the tip of the abdomen elevated, begin to release the repellent material. In addition, they attempt to overwhelm the intruder by sheer numbers, for dolichoderine colonies are often very populous.

One common species in southern California is the silky tree ant, *Liometopum occidentale*, which occurs in areas where oaks grow naturally. Foraging trails are often seen in late afternoon on the trunks of oak trees and on the ground nearby. These ants are active, aggressive and the aromatic pheromone which they release is particularly repulsive.

The formicine ants, too, lack a stinging apparatus, but effectively eject venom, as a spray (fig. 4), for up to a foot or more. The major component is formic acid at about 50% concentration. The venom, in liquid form, kills soft-bodied insects quickly on contact; against hard-bodied arthropods the venom penetrates the cuticle and kills the underlying tissues and fats. It is also a very powerful fumigant which is rapidly fatal to insects (including the ants) in a confined space. A number of our species build large mounds of pine needles, twigs, etc. As a collector of ants I have opened many of these mounds, and have often reached into the hollow scooped out for a particularly interesting specimen. I have thus had

the formic acid sprayed onto my hands. If the skin is unbroken, the only sensation is one of a faintly unpleasant tingle. But, if the spray hits a cut or scratch, the result is far more unpleasant.

On one occasion I spent several hours carefully collecting an entire colony of carpenter ants. Because the ants were so large and easily picked up, most were transferred to the jar of alcohol between the thumb and forefinger of the right hand. By the time I had completed collecting the entire colony (about 2500 ants) the thumb and forefinger tingled constantly. Twelve hours later each member possessed an enormous blister which took several days to heal. For about a week after, both were extremely sensitive, especially to heat.

In some ants of specialized habits, the mandibles are modified to aid the ant in securing its prey. The mandibles



(fig. 4)
Defensive, spraying pose
of wood-ant, *Formica*
haemorrhoidalis.

are greatly elongated and provided with several spike-like teeth near the tips. Along the inner margin of the mandibles, or projecting from the labrum (a structure of the mouthparts) are several very long hairs. When the ant is stalking prospective prey, or excited by an enemy, the mandibles are spread wide at right angles to the long axis of the head (fig. 5). The long hairs will then come into contact with the prey or enemy and act as triggers: the mandibles snap shut and impale the hapless insect on the spike-like teeth. If the insect is small, it is carried back to the nest without further ado. If large and still potentially dangerous, it is stung to death. Sometimes, when the ant lurches forward to attack, the hairs contact a small pebble and trigger

the mandibles. When this happens, the closing mandibles may, in sliding off the pebble, snap together with such force that the ant may actually be propelled backward in a somersault.

Less aggressive are the fungus growing ants which feed exclusively on fungi which they cultivate in underground chambers. The very large workers of some species, however, possess mandibles with a single long cutting edge which is very sharp and quite capable of slicing through skin and drawing blood. The mandibles are sharp enough that one may not be aware of the nicks until the blood begins to flow. Needless to say, mandibles such as these are fairly effective at reducing an ant-sized opponent to fragments.

Throughout his own history man seems to have devoted much of his energy to exploits against others of his own species. In this regard he appears

not too different from ants, albeit more imaginative. Warfare, at least in man's early history, probably was directly related to immediate needs. A growing community, whether of ants or men, requires ever-increasing quantities of food, hence, in a foraging society, an ever-increasing amount of territory. If that territory is already occupied, there will be a confrontation, or a series of them, until a new balance is established.

(fig. 5)
Stalking posture of *Odontomachus*. Note "trigger-hairs" along inner margins of mandibles.



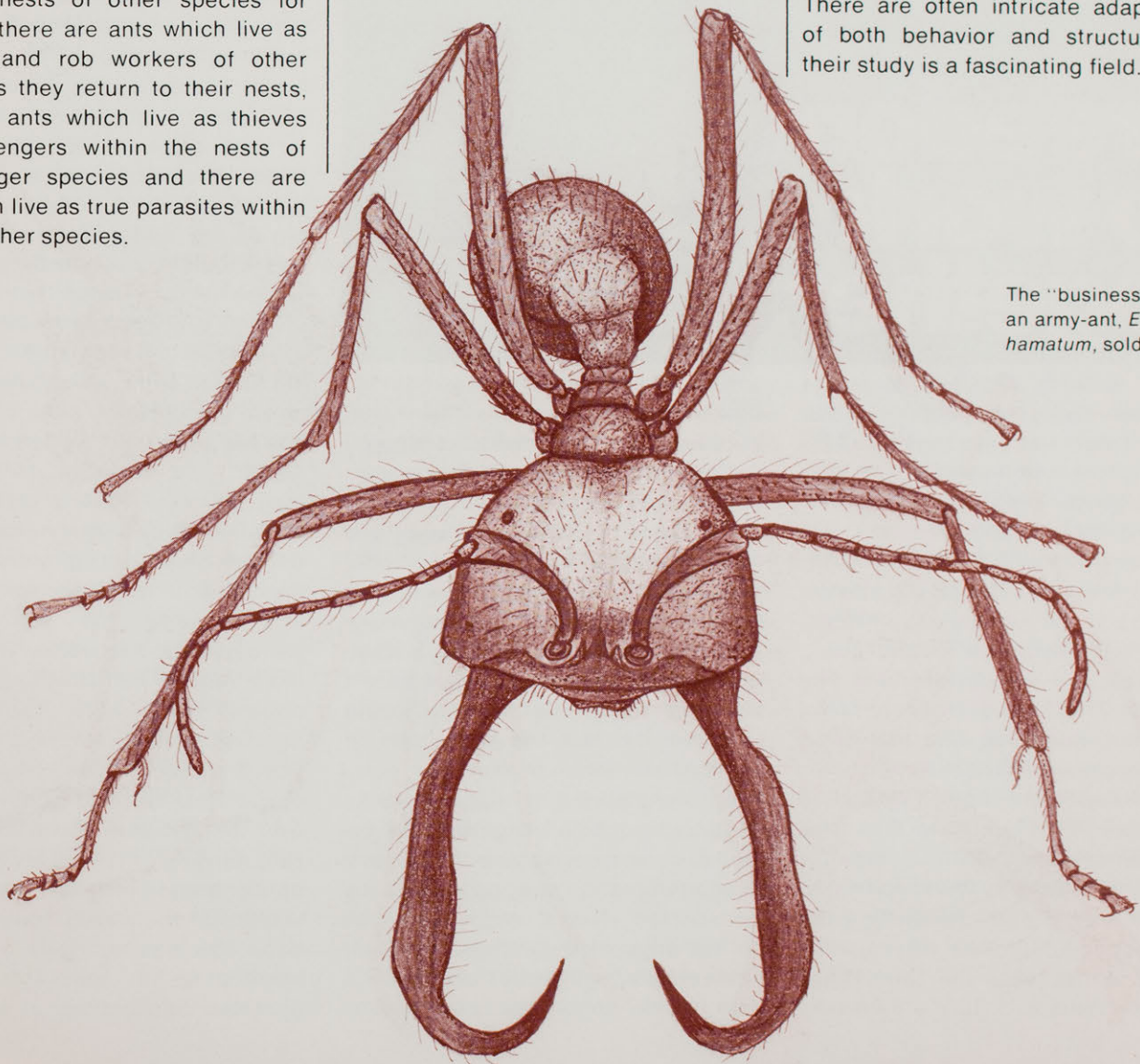
Among ants the ultimate size potential of a colony is determined to a great extent by the reproductive potential of the queen(s) within the colony. A colony will continue to grow until this potential is attained—if possible. If two newly founded colonies are established in close proximity to one another, they will grow and expand their foraging activities until they make contact with one another. A series of intermittent, but unceasing, confrontations, begin and continue until one or the other prevails. This ending usually results from one overwhelming the other by sheer numbers. Sometimes the result is the extermination of the weaker colony, sometimes it may be that the weaker colony may move to a more distant point. But, the struggle to maintain a territory of sufficient size is a continual one, and ants constantly prey upon ants. There are ants which raid the nests of other species for "slaves," there are ants which live as brigands and rob workers of other species as they return to their nests, there are ants which live as thieves and scavengers within the nests of other, larger species and there are ants which live as true parasites within nests of other species.

To defend their nests—and themselves—from the attacks of other ants and other enemies, ants have developed many strange structural modifications—armor. The unusual, and often bizarre, physical adaptations will be the subject of a future article. We shall examine modifications which may, at times, be vaguely reminiscent of our own history "in the days of old, when knights were bold."

Ant and human societies have been repeatedly compared, and their great "similarities" noted, but the comparisons are no more valid now than when first made. For, while there are some very superficial resemblances, these are not even "skin deep." The development of social organization in ants, and other social insects, was an evolutionary process fostered by an accretion of instincts in which individuality had no part and all im-

portant was the welfare of the colony. Human organization, on the other hand, appears to have evolved in an entirely different manner. Here, the discoveries of individuals, or small groups, permitted progress. Whether the discovery was the result of contemplation of cause and effect or was merely a matter of recognizing an advantageous accident, the resultant process is the same: knowledge is advanced and so is man. As a consequence I am able to sit here and contemplate the state of antdom, essentially unchanged for at least ten million years.

But, superficial resemblances do exist, even if for different reasons. Man is his own worst enemy and this is true for ants as well. And ants have evolved some interesting methods of carrying on their bellicose activities. Some are purely defensive adaptations and others are quite offensive. There are often intricate adaptations of both behavior and structure and their study is a fascinating field.



The "business end" of an army-ant, *Eciton hamatum*, soldier.



UHURU-HARAMBEE

Freedom to work together

Photos and text
by Gretchen Sibley

Light morning mists spread across the green valley of Kidepo and left ghostly mountains encircling us as we started south from this northeast corner of Uganda. The Land Rover crawled along the ruts and then sank into the "black cotton" left from the evening rain. We were off for a trip into the bush to visit the Karamojong — Hope, Phyl (Phyllis Ryde, our Guide) and I, our driver and an armed guard. The arms were a protection from marauding Sudanese who had killed three people a few weeks earlier.

We traveled the main highway, a single-lane dirt road, for a few miles and then branched off to a track for awhile and eventually found nothing to indicate even a path. Suddenly a dry wash appeared and we disembarked to hike across while the Land Rover disappeared to find its own way

across. We continued along, found a broken bridge crossing a ravine and precariously balanced on the logs on our way across. The Land Rover reappeared and we settled down once more, braced for the ruts, rocks and sharp curves around an occasional maize patch. The driver had predicted a short sixteen mile trip but we were now forty miles from breakfast. Upon questioning, he explained that he did this "every day." But further probing revealed the last trip had been in October (we were now in June).

In the distance a mass of rocks sheltered a small village and on the rocks were the villagers themselves, clambering and waving, excited by unexpected visitors. We bounced up to the edge of the village and were immediately surrounded by curious and friendly people ready to examine

us and our belongings. When proper preparations were made, we crawled out to meet the elderly chief, dressed in absolutely nothing but two fence-wire bracelets wound about his lower arms. His male attendants were a little more festive, each with a string of beads and cowry shells draped across the lower abdomen for decoration in a manner so as not to disguise their manliness. Some wore inch-long aluminum plugs secured in holes below the lower lip and others wore ivory bracelets and rings and necklaces of beads. And in honor of our presence each had quickly put on his "hairpiece" — a cap made of human hair wound about a coil of fence wire, plastered with clay, painted and enhanced with long white ostrich feathers or bits of fur. Each wore a short narrow strip of brown cloth knotted around the neck falling in any chance way. Long slender spears, manifestation of the warrior, were held erect in one hand and a small wooden stool in the other. Rich brown bodies glistened from "baths" of mutton fat and the aroma of rancid fat and smoke hung heavy in our midst. After formal introductions, the dignitaries sat on their tiny stools beside the village fence. The women and children now had their turn and we were surrounded by them and greeted with great enthusiasm which led them into song and dance. Forming a large circle, they jumped up and down, composing a song of welcome and happiness that we had found their "road", had come to visit and take their pictures. Dozens of necklaces, bare breasts and baby heads bounced up and down during a half hour of dancing until curiosity overcame them and we were again surrounded by smiling faces. The women wore a little more than the men. Each wore several dozen fence-wire (3/8" gauge) necklaces, many earrings suspended from a series of holes in the perimeter of each ear, a short apron worn low over the abdomen and a long leather skirt hanging to the ankles at the back of the body. The usual brown cloth, knotted at the throat, hung down the back. Hair was arranged in dozens of small plaits or coils stiffened with generous applications of mutton fat.

Cowry shells and bright beads brought color to bracelets, necklaces and earrings. The children were less decorated than the parents — the boys wearing nothing till they reached their teens and the girls gradually adding aprons, necklaces and hair fashions as they added years.

The Karamojong are herdsmen and live very much like most of the herdsmen tribes of East Africa. The way of life is simple and primitive because the people are nomadic, living far from the centers of rapid modernization. The men, as warriors, do little or no manual work, take ten or fifteen wives to do any necessary work and raise sons to care for the cattle, goats and sheep. The villages are small and composed of five to ten mud and cow dung huts surrounded by a fence of brush and tough, low-growing euphorbia. Small plots of maize or wheat and root vegetables grown by the women provide some nutriment but most food is sour milk and blood from the cattle. Small amounts of blood are collected from the jugular veins of cattle and put into gourds or wooden containers of clabbered milk.

Cattle are wealth and each tribe believes it has been given the privilege of owning all cattle. Obviously such conviction leads to altercation when tribe meets tribe to steal cattle and territory. The large northern tribes such as the Karamojong, Samburu and Turkana have their problems, and to solve them wrist knives, finger knives and eye-gougers are put to effective use. As the populations of both men and cattle have grown, the land is rapidly being converted to desert through overgrazing. Bulging abdomens, reddish hair and dulled intellects point to malnutrition and resultant disease in Karamoja, though the government struggles to send sufficient supplementary food. Cattle raising is an integral part of the daily living and religion of these people, and it will take many years to regulate the number and character of the herds.

In the remote northern areas, schooling is difficult or impossible because the people are scattered and nomadic. However, not all herdsmen tribes are in such poor condition. The

Masai of northern Tanzania and southern Kenya are wealthy and proud and prefer their way of life which is much the same as that of the Karamojong. Some have attended school, speak Swahili and English and are able to buy additional food, medicine and other necessary supplies. They resist Europeanization, maintaining that East Africa would be free of political and economic problems if the English had not educated the African!

We had arrived in Nairobi three weeks earlier on Madaraka day, a holiday commemorating the sixth year of freedom and independence in Kenya. It marked a keynote for my plan to study some of the changes and progress of the new East African countries. Africa is a land of great contrasts — the customs of hundreds of years juxtaposed next door to modern living. We were to see many examples of both during the five weeks of this fifth trip to Africa, and note many changes since the first trip in 1965.

After collecting supplies in Nairobi we started down the Nairobi-Mombasa road, now a "tarmac" (paved) road. We remembered the long dusty trip on our first visit through miles and miles of the scrub and thornbush of the Athi plains. It brought to mind the vivid accounts of early explorers of a hundred years previous who had taken a year or more to travel from the coast along this route which now took two days or less. Hills rolled up from the plains and the baobabs trees appeared with increasing frequency, swollen bottoms breaking into tortuous limbs, softened by tender new green leaves. In the Tsavo animal reserve the elephants played in the shadow of snowcapped Kilimanjaro, hurrying to their friends at the waterholes with ears waving and trunks swinging. Those in the pools sprayed water over their backs and rolled in the red mud, then moved to the salt licks, pushed the soil with their toes and delicately gathered the salt with the sensitive, prehensile tips of their trunks. Their quiet graceful movements contrasted with the massive bodies.

Small herds of giraffe fed from tall thorn trees and herds of impala moved to nearby waterholes while males

honked nervously. The playful young ran quickly to the water, drinking and dashing about while young males playfully locked horns. Zebra, hippos, warthogs and maribou stork completed the picture. Tsavo has changed with roads widened and improved, directional signs completed and the new lodge at Voi beautifully designed in its setting raised against a rocky hill to overlook the flat plains and rolling hills.

We went on to Mombasa, descending to the coast through banana plantations and coconut groves in the hot moist lowlands. People moved along the road, some carrying loads to market on their heads and others driving goats, cattle and fat-tailed sheep. The river winds down to the Indian Ocean and divides to move around the island bearing the ancient trading city of Mombasa. The center of town is modern and crowded with automobiles, bicycles and hand-drawn carts competing for space in the busy streets. Arab dhows float in the old harbor between the fish weirs while East Indians, Arabs and Africans haggle for fish along the dock and move back through the narrow streets overhung with balconies, and the morning wash hangs from window to window of the crumbling buildings.

The new harbor is a busy place with ships from many nations arriving daily. In the past four years European executives have been largely replaced by trained Africans at the harbor and the tonnage of imports and exports has almost doubled. Lovely homes and hotels overlook the river and sea and the city stretches across to the mainland along the coast with posh hotels along with Kenyatta's vacation estate.

Zanzibar is a contrast. We chartered a small plane to visit the island, started out in a storm and the young pilot got lost. We thought we might visit the sharks below us, but finally the pilot found the island, safely landed and rolled right into the hangar. Zanzibar is under communist control so the Friendly Tourist Bureau met us and never left our side — friendly but firm — we took each picture only by permission. Except for a few new buildings built by Chinese and

Russians, we saw no building in progress and the few stores were almost empty. Remnants of the colorful past were bedraggled and the sultan's palace was decorated by washing hung to dry on balconies which were once the site of state appearances. Zanzibar island is green and lush with clove and cinnamon plants towered over by tall coconut palms. In addition, small paddies of rice are now developed by the Chinese. The pilot had no difficulty on the return journey — Africa is rather large and he found it and traveled north along the coast to Mombasa.

We drove back to Nairobi and north to Lake Naivasha. Our friends, Phyl and Ted Ryde, own Safariland, a fishing club, on the lake. The trees along the shore and the floating islands of papyrus are lovely places for birds and we spent many hours on the lake birding and fishing until the sun settled behind the distant hills, the water turning to silver and then to gold, as the sky blazed and darkened and the birds settled down for the night. Farther down the road from the Ryde's Vicki Jackman raises race horses and has started training Africans as jockeys. Her Filter King and Amber Solair, top favorites this year, were brought out and exercised by Sunguru, Kenya's best jockey and another well-known rider, Sirigoi. The revenue from racing is important to the government and it is hoped that Africans will soon learn to handle the necessary training. At present non-citizens in Kenya may not hold any position if there is a trained African for the job, so Mrs. Jackman is still able to maintain her stables. The population explosion has reached East Africa and unemployment is becoming a problem in some areas, for education and training do not correspond to the job opportunities.

We traveled over the Abadare mountains in the morning on a dirt track rising to over 11,000 feet through tall feathery bamboo forests and dense heather, torn and trampled by elephant herds. This was Mau Mau territory during the emergency but is now a national reserve with an extensive reforestation program in process.

The track leads into the rich highlands crowned by Mt. Kenya and we were headed for a wedding on its slopes at the Mt. Kenya Safari Club. Susie and John Jeeves had invited us to their wedding so we stayed at the club and helped with the preparations. John's photographer friend was involved with a cattle shipment so I became official photographer. We traveled to the small stone church down the road from Nanyuki. The church was crowded and the sun streamed lovely colors from the stained glass windows on Susie's beautiful white gown. John was tall and dignified in his morning coat and the Anglican vicar, gray and bronzed from many years in the African sun stood in his dark gown.

We traveled back to the club for a wonderful garden reception for three hundred people, several white peacocks, two gaudy parrots, a cage full of vervet monkeys and Susie's horse, Toto, who made a brief and frightened appearance slightly appeased by sugar from Susie whom he didn't recognize in veil and wedding gown. It was a gala affair complete with champagne, hors d'oeuvres, wedding cake, flowers, fancy dress and Jimmy Keen's green kilt.

A land of contrasts — we were off for the northern frontier the next day to visit Maralal. High above the Rift Valley the light forest spread over the mountains where we found the small lodge presided over by Freddie who ruled his domain with steel gray eyes under bushy gray brows. A visit to the lodge depends upon Freddie's pleasure and one stays on one's good behavior or is invited to leave. We had brought the cook and food and Freddie provided accommodation and endless conversation about the "good old days." We escaped by day to enjoy the constant procession of zebra, buffalo and antelope visiting the water hole. One day we drove to the beautiful great Rift stretching for miles into the barren hazy north. The Samburu live there and we met many young boys caring for their herds of cattle, sheep and goats. The warriors walked along the road, spears in hand, beads across chests and elaborate hair-dos. The hair is twisted in small

strands with sheep wool, red ochre and mutton fat and pulled over the forehead. Some fasten the strands together with safety pins and buttons and others form a kind of vizor. One warrior was fascinated by my hair and wanted to touch it so I reciprocated by touching his to find it like greasy felt. These are handsome people, very friendly and quick to protect their rights. That night a band of Somali bandits appeared near the lodge and the trusty warriors took off after them. No reports on the results but to our relief the Somali disappeared.

Agriculture is a vital part of the African economy so we traveled back to the highlands beneath Mt. Kenya to study it. We stayed at the cattle estate which Phyl and Ted had recently sold to Africans. The Kikuyu once lived and farmed in the highlands but each family raised only enough for its own needs. When the European settlers arrived, they took over large areas of land to raise cattle and develop such crops as wheat, maize and coffee. The rich land and hard working settlers produced an abundance of food for home consumption and export. After independence many Europeans sold their lands to Africans, most of whom had little or no background to enable them to handle large farms. The estates were largely neglected with only small patches farmed to produce food for the immediate families, leaving Kenya dependent upon England and the United States for food. Gradually the government has taken over and crops are improving. Phyl and Ted sold their 6,000 acres to a group of 2,000 Africans who also purchased an adjoining 11,000 acres. Ted was asked to stay on for five years to train Africans to handle the acreage.

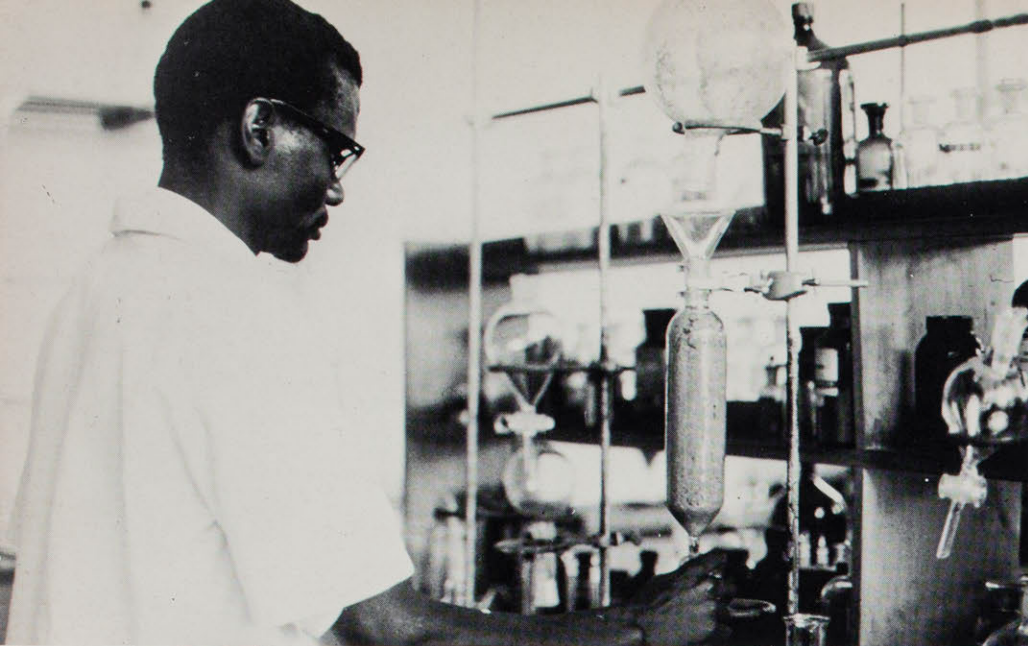
I spent a day at the Pyrethrum Board in Nakuru — Pyrethrum farming is a good example of one answer to one of the agricultural problems of Africa. Pyrethrum is a non-toxic insecticide obtained from the flower of a kind of chrysanthemum. Small patches of these plants are grown on many farms and since flowers are picked for ten months of the year, farmers realize a small, constant income while they wait to receive a yearly income on

The progressive modern
city of Nairobi, capitol
of Kenya



Narok, capitol of the
Masai tribe, is a string
of wooden buildings
under the trees lining
the road.





Chemical research is carried on by a well educated African.

Modern ships from many nations visit Mombasa Harbor.

The University of Nairobi provides fine training for young African leaders.

Sunguru riding Filter King.



Arab dhows travel into Zanzibar as they have for centuries.

Fence wire, beads and carefully coiffed hair adorn these Karamojong women.

The beauty of this young Samburu wife is enhanced by her jewelry. Her husband stands proudly with his hair fashioned into an eyeshade.

Friendly Karamojong men. Notice the lip plug on the left and the wrist knife in the center.



A young cheetah by its mother watches every move.

wheat, maize, etc. grown on the rest of the farm. East Africa produces 90% of the pyrethrum in the world and sells 40% to the United States. The Pyrethrum Board supervises every phase of the production including research, training of farmers, production of pyrethrum powder and insecticides. An industry that was once run by Europeans is now largely controlled by Africans. Well educated African business men and scientists have increased production, raised the pyrethrum content of the flowers and established a research, testing and advisory laboratory that helps insecticide industries all over the world. We visited the offices and production plant and spent time in the research labs where chemists study insecticides and biologists make genetic studies on plants and test insecticides on various kinds of common insect pests.

We had chartered a plane to visit Kidepo and the Karamojong and flew from there to Murchison Falls. The lodge at Paraa is new and seventy-five miles north of it on the Victoria Nile is the new lodge at Chobe, both large and modern enough to take care of the great influx of tourists now pushing tourism to a close race with coffee as the greatest source of income in East Africa.

The Victoria Nile falls through a narrow gorge at Murchison and widens to form a perfect home for hippos and crocodiles with elephants, buffalo and many antelopes and birds along the shores. We chugged along in our boat between the families of hippos and watched the crocodiles resting with gaping mouths along the shore and on the sand bars. Near the falls we counted seventy-nine crocs in one spot on the bank. Elephants climbed up and down the steep banks to reach the water and food of lovely green plants growing in abundance. Pied kingfisher hovered high over the water and dove for food while egrets and Goliath herons stood fishing along the shore or perched on trees and rocks. The river flows wide and smooth dotted with bright green spots of floating Nile Lettuce and the sawtooth backs of submerged crocodiles.

Upon our return to Kenya we drove to Mara in Kenya and across to the Serengeti in Tanzania. The road is one of the worst — deep in dust or thick with rocks — but within two years the new road now under construction will provide tarmac to the parks. There was no rain in April and May and animals in large herds were migrating from Mara to Serengeti and towards Lake Victoria. We are happiest watching the animals, and of the tens of thousands we saw this year our most pleasant experience was visiting a mother cheetah and her three young kittens. She lay in the shade of a tree on a grassy plain while her three young played and fed and gazed at us in fascination. Their sharply marked faces surrounded by a heavy gray mane are the most attractive of the cat family.

Plague in Tanzania caused us to retrace our steps through Serengeti and Mara. Between Mara and Nairobi is the Masai capitol, Narok, an example of an old African town. The center of town is two blocks long, one side of the road lined with ramshackle wooden buildings housing stores owned by Africans or East Indians. On the meadow across the road we saw a herd of cattle grazing, and under shade trees Masai women had spread their wares in the open-air market. The only modern buildings were about a mile out of town — government school buildings.

Nairobi as a railroad camp at the turn of the century had looked very much like Narok. Today it is a modern city housing over a half-million people. The streets are choked with automobiles and buses and the skyline is rapidly rising with excellent hotels and office buildings. The broad avenues are lined with exotic and colorful African plants and the new parks lend spots of beauty for recreation.

I spent a few days visiting schools, colleges, businesses and industries. Nairobi University is a large modern university, one of several in East Africa. The well-dressed, sophisticated students in European clothing are a great contrast to the Masai and Karamojong warriors. The East African Airlines are a good example of a successful African en-

terprise. Service is provided to twenty-six airports in East Africa. Service is also provided by VC10s to many cities in Europe and Asia and will soon include New York. Most operations are handled by Africans, though the VC10s are still piloted by Europeans because African pilots have not been flying long enough to meet safety requirements. The rapid change from village life to modern industrial life is a very difficult adjustment. For instance, African airline hostesses must complete not only the regular course of study, but must be introduced to many customs of modern living foreign to them.

While East Africa has many problems, foreign business is showing respect and confidence by establishing offices and manufacturing plants in the three countries (Kenya, Tanzania and Uganda). Much of the credit for this progress in Kenya is due to the work of the two brilliant leaders, Jomo Kenyatta and Tom Mboya. Two days before our departure, Tom Mboya was killed — an act stemming from tribal prejudice, one of the big problems of Africa. Nigeria has fallen to its power and the leaders of East Africa are working to break the hold of tribalism as well as that of illiteracy and poverty. The road ahead is a difficult one but time, experience, education and the intelligent aid, patience and understanding of other nations will do much to insure the success of these struggling young African nations.

1200 FIELD ASSISTANTS

by **Edward C. Wilson** Curator of Invertebrate Paleontology

The message has been coming in loud and clear from the Field Museum of Natural History in Chicago: large groups of amateur paleontologists can be valuable field assistants. Although the evidence of their contribution in collecting quantities of the 300 million year old Francis Creek Shale plants and animals from Mazon Creek, Illinois and nearby areas is impressive, it still has done less than convince a long list of paleontologists that this method might work for them. Strike me from that list!

When Ted Downs, Chief Curator of the Earth Science Division of the Los Angeles County Museum of Natural History, approached me some months

ago about leading a large group of Museum Alliance members on a fossil hunt, I was hesitant. Within seconds after he had wrestled a weak yes from me, I walked docent Vita Tannenbaum, the program chairman for these events, to begin setting up logistics. A trap, I realized too late.

Dimensions to Delight, they call these nature walks and, I thought . . . well, never mind what I thought. It had to do with sacrificing time from exhibit preparation, curating, research, and field work. How many field seasons does a man HAVE, curators may shout when faced with such interruptions.

Under the capable direction of former Senior Curator of Vertebrate Paleontology, J. R. (Reid) MacDonald,

and Alliance Administrative Secretary Fran Kellough, we hammered out a program that finally included mimeographed notices, maps, bibliographies, and white, green, blue, and pink tickets. Very colorful, was my still somewhat skeptical reaction. To my fears, such as what do you do on a treeless plain with a horde of people in need of a restroom, Fran and Reid gave me their succinct counsel. "Don't worry," they said. The minimum age was set at 7, the maximum age was open, a choice of one of two sites (thanks to the Irvine Company and the City of Los Angeles) was given, and the notices went out. We expected about 800 sign-ups.





Part of the Alliance members collecting Pleistocene fossils on the third weekend of the Dimensions to Delight dig at San Pedro. An equal number were present off the left edge of the photograph. This hill had been a favorite climb for motorcyclists.



Two motorcyclists found helping us more fun than dodging the pick handle Joe Cocke threatened to shove through the spokes of their wheels if they continued to VAROOM up and down our slope.

The response was thunderous. After Fran had taken 1,200 and opened an extra weekend to accommodate the overflow, she regretfully began returning checks. Many requests to be included on this trip by nonmembers (join up, you all, hear?) had to be turned down. Just plain people are just plainly interested in fossils, you see.

We had two evening instant geology/paleontology lectures, which began with the origin of the solar system and proceeded, via the convection current route, to the filling of the Los Angeles Basin and the upthrusting of the Palos Verdes and San Joaquin Hills. Special instructions included the restriction that no digging tools larger than garden trowels would be permitted, recommendations to bring picnic lunches with water, and (I *still* worried) an announcement that there would be no restroom facilities available.

At 9:30 on the first day, I was alone at our meeting place in San Pedro, with a Museum Alliance standard firmly planted nearby. At 10:00, we split the large group that had assembled by then, and hiked the first half in to the site with Shelly Applegate, our Associate Curator in Vertebrate Paleontology, as guide. I followed with the second group in ten minutes, so as not to cause confusion. When we stopped at a lookout point to view the terraces of the Palos Verdes Hills against the skyline, the first group was already collecting from the site, and we quickly followed. As the collectors spread out laterally along the long, narrow fossil bed, I noticed that all of those at one end were about six feet higher than the rest of the group, and hurried over to place them lower on the right layer. To my surprise, I found that they were on the right layer. They had unknowingly mapped a fault for us!

Now, for the sake of conservationist readers who are easily aroused, let me say something about this site that applies equally well to the one at Newport Bay where Reid MacDonald was chief guide, assisted by Laurie Bryant, Mike Hammer, and Mel Webster. First, the fossils are exposed in cuts through a Pleistocene marine

terrace. They are extremely abundant. They have been studied for many years in this area. The exposures will soon be destroyed by landscaping at Newport Bay and by garbage fill at San Pedro. We had complete control of our groups, all of whom understood the need for turning rare specimens over to us for the museum collections. None of our activities could be construed as vandalism. On the contrary, we were constructively collecting sites that will be destroyed. There was no harm done to paleontology by permitting our collectors to take home representatives of the common species.

So there we were in San Pedro, collecting from a single bed of 100,000 year-old fossils in unconsolidated sand on a gently bulldozed slope. The bed thickens from about 2 feet at the north end, to about 6 feet a short distance to the south, where it includes a thin basal conglomerate of cobbles. The questions were quite naive at first. What caused the round hole in this clam? What is this funny looking shell (common names only, please)? Why are the older terraces on top when you told us that in geology older rocks are on the bottom? And many similar things about morphological, ecological, and geological details.

The guides passed from person to person, stopping to answer questions and give advice about collecting. The fossils fell out of the sand at a touch, except for large specimens, and it was only necessary to brush the sand away from these. Many people collected float fossils by screening loose sand on the slope below the fossil bed.

Collecting techniques, therefore, were a snap. By noon, everyone had settled down to doing his thing, such as collecting a variety of species, or growth series of certain species, or species only of certain sizes or kinds.

Then came lunch, a few people went home, and afterwards, the dedicated majority returned to the hill and continued. They were now experienced amateurs and needed little further collecting instruction, although there were more questions about the specimens.

We repeated these procedures with

a different group each day for five days. There were distractions such as dust storms, cut fingers, and motorcyclists who wanted to share our slope, but nothing kept us from collecting, collecting, and collecting.

During all the preparation for this trip, there was something that I had not told anyone. The museum did not already have a collection from the San Pedro locality. Our collection from the Newport Bay locality is very large and famous (Los Angeles County Museum Contributions in Science No. 31, 1959). I carried a box with me and, with the help of Shelly and the other two guides, Gale Sphon and Joe Cocke, picked up representatives of all the common species. The busy Alliance members turned up the rarer specimens, which they willingly gave us for the museum or promised to bring in later, after proudly showing them at home and at school. We screened a barrel of fossils to be sorted later at the museum.

Altogether, about 200 species of Late Pleistocene age marine invertebrates, mostly seashells, were collected in the five days at San Pedro. There were also a number of vertebrates, mostly sharks, of the same age and several species reworked from Miocene rocks of the Palos Verdes Hills. This is a significant new collection of fossils from the Palos Verdes Sand for the museum. Since so many species were represented by single specimens, it is unlikely that any other method would have produced so large a fauna in such a short time.

The Newport Bay group collected ten species very rare there, including one not yet reported, for the museum.

This experience has convinced me that cooperation between amateurs and professionals in the field can produce valuable results, even when the collecting is only incidental to the primary purposes of the trip. The primary purposes in this case were education and fun. A measure of the success is that the eight guides learned something new about collecting and had at least as much fun as the 1,200 Alliance members.

And (Oh! Calcutta!) nobody asked for the restroom.



Digging Fossil Whales in Mississippi with Southern Hospitality

by **Shelton P. Applegate**
Associate Curator,
Vertebrate Paleontology

You could have squeezed water out of the air with your hands; the temperature hovered around 103 degrees, yet an occasional breeze would flap the khaki canopy. The middle of Lester Huff's cow pasture looked like either an old fashioned tent meeting or, maybe more accurately, a local burial. Certainly a large mound of fresh dirt was present and a crowd stood around and under a canopy. Cars, farm trucks, and more cars kept arriving and leaving, churning the grass to dust.

People of every sort, drawn by the newspaper story of Mr. Huff's monster, gathered around us, mothers, babies, fathers, teen-agers, and small children from all over central Mississippi. The air swarmed with jokes, wise cracks, and questions.

An old weatherbeaten farmer solemnly told us that this is where he buried old granddad's mule. A plump, pretty farmer's wife with three small children edged to the front of the crowd. Looking both worried and puzzled she said, "Them things are nothing but old tree roots." Greg Wickes carefully pointed out the three-foot skull with its huge step-like yoked teeth from which the name zeuglodon comes, the elongate barrel-like vertebrae, and the heavy ribs that she was calling roots. The lady looked closely, scratched her head, and said, "They still look like tree roots to me." One gray haired cattleman told us that we just had a dead Indian; another farmer said slowly, "This whale must have been beached on a sand-bar during the great flood."

A local merchant retorted that these bones were even older than the flood. Larry Barnes told group after group that Mr. Huff's whale was a 40 foot zeuglodon, a toothed whale, that swam in the tropical Late Eocene Gulf embayment seas some 50-odd million years ago, died, and sank down to a soft sticky bottom, there to lie and leave broken bones exposed long enough to form a reeflike home for hundreds of oyster shells and moss animals or Bryzoans; finally to be covered by slow currents bringing in fine mud.

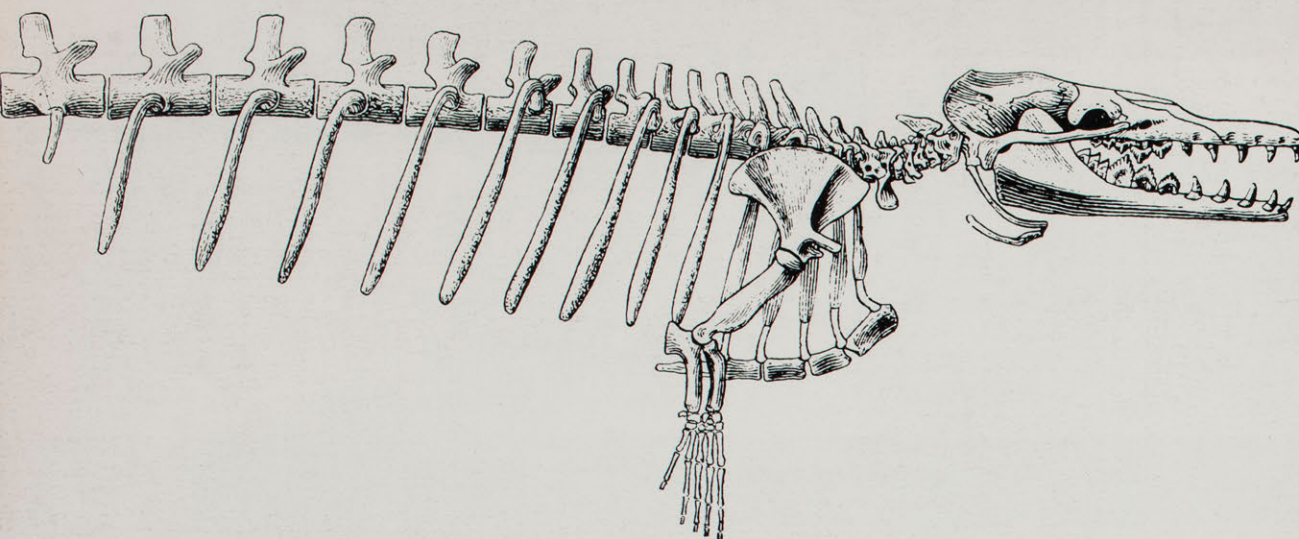
This mud was later dried and altered into a clay that has been given a geological name, Yazoo, after Yazoo City, Mississippi, where it was studied. Even though many of the people knew little about the fossils, they seemed to know something about the clay. More



Dr. Applegate and Larry Barnes uncovering zeuglodon ribs. photo credit: Mr. Erle Johnston, Scott County Times.



Applegate, Kim, Doyle and Mrs. Blalock, Kim holds a fossil swordfish bill, Doyle the old whale-like vertebra- photo credit: Erle Johnston, Scott Co. Times.



than once we heard the local saying: "If you stick with this clay when it's dry, then it will stick to you when it's wet." This fact we later found to be true in every sense of the word.

Chip, who was Curly's prized hound dog, a big black, brown, and white animal with one blue eye and one white, was in paradise. There were so many folks there just to pet him all he had to do to get the maximum attention was to walk over to where we were digging, knocking our grid strings down and put his head in the lap of Neal Wood, who was hard at work uncovering a rib—fossil bones didn't interest Chip in the slightest. Richard and John, my two sons, would grab poor Chip, haul him off to Mr. Huff's farm truck, and Greg would drive him a half a mile or more down the road, only to later find that Chip usually beat the truck back to the quarry. Chip was certainly our most enthusiastic fan.

When Larry, Greg, and I told people we were going to Mississippi to collect a whale, many thought that we would catch one in the Mississippi River. Our whale was quite a different breed of fish, I mean mammal, since whales of course are not fish. The fossils we were after are some of the most an-

cient whales, or in Latin, *Archaeoceti* (this means ancient whale) with a head that was more opossum or shrew-like than that of present-day whales. The teeth are huge, and not all peg-like as in modern toothed whales.

The Huff farm whale was *Basilosaurus cetoides*, which means the whale-like king of the reptiles, an obvious misnomer. The later name, zeuglodon or yoke-tooth, is certainly truer, but the oldest name has to be the scientific one according to the rules. Zeuglodon can only be used as a common name, a practice that is followed in this case. Our Mississippi whales, though having many primitive characters, have some very unwhale-like features also, enough to exclude them from any direct line of ancestry as far as the living whales are concerned. For example, the vertebral disks are attached to the central part of the vertebrae or centrum. In the region of the trunk vertebrae these disks are as thick as the centrum. This results in doubling the length of the vertebrae.

At the Los Angeles County Museum of Natural History we had one of the largest collections of fossil whales to be found anywhere, but no specimens of any of the early Eocene whales. In

fact, not only are such whales rare, but only one specimen is now mounted for display; this is in the United States National Museum. As a graduate student, I had always been fascinated by this so-called "King of the Reptiles," with its great snake-like skeletons which I could picture just lying under Alabama cotton fields waiting to be collected.

Then, in the spring of 1969, the Earth Science staff members and Dr. Herbert Friedmann, the director, agreed that a mounted zeuglodon under our modern whale skeleton in the Hall of Evolving Life would make an impressive display worthy of our Museum. Mr. Timothy Doheny, Trustee, provided supplementary funds, and the dreamed-of trip became a reality. We knew that these whales occurred in Alabama, with a few specimens having been collected in Mississippi. When we found that Sparky Johnson of the Southern California Paleontological Society, a group sponsored by the Los Angeles County Museum, was going east, we pressed him into service as an advance field man. We read Dr. Remington Kellogg's classic paper on zeuglodons and planned Sparky's trip accordingly. One place that was men-



Zeuglodon Vertebrae in place on the Idom farm.



Applegate and Neal Wood undercutting a block containing part of the skull of the third

whale, rest of party digging up vertebrae under the canopy.

tioned several times was the geology collection at Millsaps College. Sparky went first to Millsaps and there met Dr. Purdy who is a professor of geology.

Dr. Purdy convinced Sparky that the place to find zeuglodon was near Jackson, and so it was to Jackson I decided to go. When Larry Barnes, a graduate student at Berkeley who is studying fossil whales, heard of the zeuglodon trip he said, "Take me with you," and even gave up a job he had been offered in order to go. Greg Wickes, a high school student at Claremont, expressed interest in the trip and I knew that he had the high spirits and ability to really pitch in and work when needed, traits that are especially important when you have a group of people collecting for a long time. Neal Wood, a high school student, joined our party in Texas. When we arrived in Jackson, Dr. Purdy had found us lodging next to the college, owned by Mr. and Mrs. Castle, who not only put up with our strange comings and goings, but let us store crates of whale bones in her garage.

While we were conducting our early and fruitless search for zeuglodon bones during the first few days we were in Jackson, I was invited to talk to the Mississippi Gem and Mineral

Society about our project. Here we met a number of really enlightened fossil collectors who not only expressed interest in our project but later proved their enthusiasm by helping us excavate fossil whales and giving us more leads than we could possibly follow. Among these helpful people were the Leslie Pitts family, of whom Patrick Pitts helped us just about everyday and became such a part of our group that we finally had to take him east with us after we finished in Mississippi.

The Blalocks were not at this meeting but we heard of their collecting feats — all of which proved true. A few days later, Doyle Blalock and his son Kim walked to the Huff farm fossil whale site, shook our hands, and said, "We are here to help you and learn." In the end we learned a lot from the whole Blalock family. Everyday after Doyle had delivered the mail he and his family would appear at whatever whale we were excavating, with an ice chest full of cool drinks and loads of that give-and-take humor that keeps everyone laughing, and is essential when heavy work is involved, and excavating whales *is* heavy work.

The Blalocks took us to several fossil localities and showed us a

swordfish bill and vertebra that they had collected. The bill or tip of the snout was over 18 inches long and must have come from a huge fish which may be one of the largest known Eocene bony fishes and also a species new to science. Along with the bill, Doyle and Kim gave us a small vertebra which lacks any processes but looks like the backbone of a very primitive whale. It was taken from the Bashi Formation and is some 60 million years old. We believe it represents the oldest New World record of a whale and perhaps the oldest whale.

Whales could have arisen from some American land mammal in the Paleocene or early Eocene in the gulf coast region or if not there, perhaps in Egypt or even California, all places where the marine beds of the right age exist. Middle Eocene whales are known from Egypt. California, however, has yet to produce any Eocene whales.

The weather in Mississippi was rather amazing. The days were hot, windy, and dry, but later in the afternoon, thunderheads would form and sweep across the countryside bringing high winds and driving rain. The Southern Baptist Church, of which



Greg Wickes and Chip.



Preparing to tip a block with the Huff farm skull, Applegate, Wood and son Richard.

Mr. Huff is a prominent member, was having a revival when we arrived, and Mr. Huff invited us to attend. We were delighted, since none of us had been to a revival before. As we drove to Forest that evening, the sky became overcast and then the rains started pounding down, and storm gusts blew leaves from the trees. Immediately we thought of our poor whale in Mr. Huff's pasture, half exposed and covered by a canopy which was not erected to stand that much wind. I could picture all our whale bones being washed down the gully, and lost. When we reached Forest, we dropped off the younger boys at the church and hurried out to the fossil site.

Sure enough, our canvas was down and the bones were beginning to get soaked. We could only drive to within a city block of the specimen. The rest of the way was across wet grass and sticky Yazoo clay. I had been stuck too many times before in similar situations to risk driving in the station wagon. We decided to run the rest of the way. Since we had on our best Sunday-go-to-meeting clothes, our first thought was to take them off and make the dash in the nude, but I could picture the shock a neighbor might get seeing three naked men dashing

across Mr. Huff's cow pasture when they should have been in church, so we decided to take off everything but our pants.

Chuckling at the silliness of it all, with lightning and thunder crashing around us, we ran. I slipped, almost turned a somersault, and got up to find that the front of my pants was covered with mud. Larry and Greg were howling with laughter and we ran on. In a minute we had the canvas up and the specimen was saved. We arrived back at the service wet and bedraggled, and I was still a little muddy, but we were in time to hear a rousing service.

After we crated and shipped the Huff whale we drove south to Pinkston Hill and the farm of Mrs. Idom. While we were at the Huff farm, Mr. Erle Johnston had written an excellent article on our work, so Mrs. Idom knew about us and was all set to get in touch with us. We asked if we could look for zeuglodon bones on her property. Mrs. Idom, in a most gracious way, said not only could we look, but anything we found she would personally give to the museum.

What more could we ask for? She took us out into the backyard and showed us a large pile of bones that her late husband had collected—a

whole wagon full. We walked to the first set of gullies in back of her house and immediately I noticed the tell-tale surface pieces of bone that hinted at a skeleton underground.

We staked out the limits of the whale and continued searching. About one-quarter of a mile from the first whale we found the vertebra of another. With two whales located, I made everyone stop looking and start setting up to dig. I gave the first whale to Larry to work on and I took the second. The second whale turned out to be the better of the two, being the more complete, but the first whale gave us a lot of good material that can be used in studying the detailed anatomy. We had, among other things, a good humerus or upper arm bone. These whales had arms that were moved in sea lion fashion, being highly flexible and not as rigid as in the modern whales.

The second specimen was much larger. The vertebrae we found were from the middle of the body and rested half way down a gully. As we traced the skeleton up the slope we found vertebrae in the soil for about 20 feet, then they disappeared underground. We dug down and found ribs and more vertebrae, and indication that we were



Ribs in plot on Huff farm.



Canopy, field crew and County station wagon at Huff's farm.

headed towards the front of the whale. In another pit close by, lucky Greg Wickes found what looked like skull bones and further digging produced jaws with teeth. The tail was missing, as in all our specimens. This third whale covered an area of about two hundred feet but it was definitely spread apart. For example, the four-foot skull covered a seven-foot long area. Between the ribs we found a wonder among wonders, a rock-like concretion of a white limestone-like material, inside which we found head bones, fin spines, vertebrae, teeth, and scales of bony fishes. Among the bony fish scales we have been able to identify those of a herring, but there is evidently a great variety of other kinds of small fishes in this concretion.

In addition to these remains we find also hundreds of shark denticles, or body scales, as well as cubes of calcified cartilage, vertebrae, and so far two teeth. The denticles suggest a great variety of sharks; the teeth are those of the mako and perhaps a small sand shark. Near one of the zeuglodon skeletons was a beautiful tooth of the great white shark, *Carcharodon auriculatus*. This would have been a possible enemy of zeuglodon, but we now know that sometimes the situation

might have been reversed and that zeuglodon ate small sharks.

It is not hard to envision a deep blue ocean with the sun's rays like great shafts reaching into the depths. Soon we can make out a huge school of herring swiftly swimming into view, followed by a school of sharks darting into the herring school at every opportunity. Both sharks and herring soon become oblivious to their surroundings. As the feeding increases to a frenzy, suddenly two great dark forms race like arrows into the harried school, one from below, the other from the side, the snake-like bodies moving in rapid vertical undulations. Once in the school, they check their speed with their large paddle-like flippers. Their great jaws are opened, their heads twist and turn, and sharks and fish are snapped up, scores in a single bite. The water turns red with blood, and bits of fish drift to the bottom, to be picked up and eaten by the whales when the school has finally escaped.

The above scene is based on a possible explanation of the food found in the whale. Of course, zeuglodon may not have fed or swum in this way at all.

After three days of solid work, broken by a swim or two in Mrs.

Idom's cattle pond, with an admiring herd of cows looking on, Larry had collected the first whale we found on the Idom farm and I was in the process of collecting the second. That afternoon we got our first bad storm, and it rained most of the night; we concluded we must finish up the next day.

The rain had fortunately stopped by the time we reached the site, though as we worked several rain clouds passed by. As we wrapped and boxed the bones, load after load went to the station. Just as it was getting dark, I started on the last bone at the end of the skeleton. The vertebrae were so decayed that they were not much more than piles of sand. We collected what we could of these. As night fell, we were still hauling crates. Finally we came back to the site, after saying goodbye to Mrs. Idom, to pick up the boys, but found no one there on the dark road. Larry and I stepped out of the car to be hit by a shower of dirt clods and a shout of "Yazoo" from the boys. We laughed; it was all over.

The next night, at the Pitts home in Jackson, we watched the moon walk, a long way in time and space from that lonely, tropical, 50 million-year-old sea, where zeuglodon roamed.

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